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10/549,444

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Eric Sion

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EXAMINER

TUROC, DAVID P

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

10/02/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                    |  |
|------------------------------|--------------------------------------|------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/549,444 | <b>Applicant(s)</b><br>SION ET AL. |  |
|                              | <b>Examiner</b><br>DAVID TUROCY      | <b>Art Unit</b><br>1792            |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 13-18 and 20 is/are rejected.
- 7) ☒ Claim(s) 10, 12 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendments, filed 7/13/2009, have been fully considered and reviewed by the examiner. The examiner notes the addition of new claim 21. Claims 1-21 remain pending in the instant application.

### ***Response to Arguments***

2. Applicant's arguments filed 7/13/2009 have been fully considered but they are not persuasive.

The applicant has argued against the combination of references stating that the examiner has failed to establish a prima facie case of obvious for combining the teachings of a densification process with a CVD process. However, the examiner notes that the CVI process as taught by Leluan is a CVD process, i.e. a chemical vapor infiltration process, which results in deposits (i.e. chemical vapor deposition) within a porous structure. CVI deals with deposition of material within the pores of a substrate and thus a deposition occurs. See provided factual evidence, which states "Chemical vapor infiltration (CVI) is a variant on Chemical Vapor Deposition (CVD). CVD implies deposition onto a surface, whereas CVI implies deposition within a body."

The applicants have argued against the Glasier reference arguing that the reference fails to disclose regulation of the benzene concentration could assist in keeping the microstructure unchanged, however, this is not articulated in the claims and thus must be deemed not commensurate in scope with the claims as written.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Specifically, Luluan discloses advantages to controlling the vapor deposition process, coating the interior of pores, Gaughan discloses the advantages of real time control of a vapor deposition process by using a residual gas analyzer and measuring the residual gas exiting the chamber to determine the extent of the process and Glasier discloses benzene is a by product of the carbon deposition using ethane (the same as Luluan) and therefore taking the references collectively, it would have been obvious to have modified Luluan to use a RGA to control the process real time by measuring the effluent gas and benzene is taught as a by product of the deposition.

The applicants argue that even in the event that the combination is accurate, the combination only discloses the determining an already completed process has deposited according to specification. However, as discussed in the prior art rejection, However, Gaughan discloses controlling a vapor deposition process by using a residual gas analyzer can improve real time monitoring of the process (Column 4, lines 10-48) and the deposition can be monitored on a continuous basis and by measuring the effluent gas the amount of deposition can be determined in situ (also column 4). Therefore, it remains the examiners position that the process is controlled continuously during the entire vapor deposition process.

The applicant has argued against the combination of Birakayala reference, stating that the reference does not provide an indication or suggestion that the densification process could be controlled as a function of  $C_3H_4$ . The examiner disagrees. Birakayala explicitly discloses the byproducts of the CVI process and discloses the amount of the  $C_3H_4$  can be measured. Therefore taking the references collectively, it would have led to predictable results in using the RGA to determine the amount of carbon deposit by measuring the  $C_3H_4$  because Birakayala discloses such is a measurable byproduct of the carbon deposition.

### ***Double Patenting***

3. Claim 10 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 21. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1-4, 6-9, 11, 13, 15, 16-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6001419 by Leluan et al, hereafter Leluan in view of US Patent 6210745 by Gaughan et al, hereafter Gaughan and further in view of *Formation of pyrolytic carbon during the pyrolysis of ethane at high conversions*, by Glasier et al., hereafter Glasier.

Leluan discloses a method of controlling or modeling the process of densifying at least one porous substrate with pyrolytic carbon by chemical vapor infiltration, the process comprising: placing a load comprising one or more porous substrates to be densified in an oven; heating the substrate(s); admitting a reaction gas into the oven, the reaction gas containing at least one carbon-precursor hydrocarbon; adjusting the pressure in the oven so as to enable the gas to diffuse within the pores of the heated substrate(s) so as to form a deposit of pyrolytic carbon therein; and extracting effluent gas from the oven via an extraction pipe connected to an outlet from the oven. Leluan discloses controlling the temperature and pressure in the oven so that deposits are formed, however, the Leluan fails to disclose controlling the process by measuring the contents in the effluent gas. However, Gaughan discloses controlling a vapor deposition process by using a residual gas analyzer can improve real time monitoring of the process (Column 4, lines 10-48), Gaughan discloses improving control can provide benefits including reduced cost and discloses controlling pressure and temperature to control the process (Column 4). Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art to have modified Leluan to use

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analyze the effluent gas to control the process, including gas flow rate, temperature or pressure, to reap the benefits as taught by Gaughan.

Leluan in view of Gaughan fails to disclose measuring the content of allene, propene, and benzene in the effluent, however, Leluan discloses depositing pyrolytic carbon by vapor infiltration using an alkane (Column 1, lines 30-37 and Column 4, lines 40-45), Glasier discloses formation of pyrolytic carbon using ethane discloses benzene is a known product and the amount of benzene in the effluent gas relates to the carbon deposition (figure 1 and 7, page 19, and Table 1). Therefore taking the reference collectively, it would have been obvious to one of ordinary skill in the art to have controlled Leluan in view of Gaughan by measuring the benzene in the effluent gas because such is taught as a known product of pyrolytic carbon deposition and one would expect predictable control of the process by using residual gas analysis of the benzene.

Claim 2 Glasier discloses the benzene concentration directly relates to the deposition rate and therefore it would have been obvious to have controlled the process to maintain the constant benzene concentration to reap the benefits of constant and controllable deposition rate.

Claim 3: The references fail to disclose a duct parallel to the extraction pipe, however, it is the examiners position that such is merely a design choice and one would reasonably expect successful results in providing such an arrangement in the process as taught by Leluan in view of Gaughan and Glasier.

Claim 4: Glasier discloses that the content is measured by gas chromatography (page 18).

Claim 6: Gaughan discloses controlling the temperature of the chamber to control the process and thus it would have been obvious to control the temperature of the process as a result of the benzene concentration.

Claim 7-8: Leluan discloses propane and methane (column 4, line 40-45).

Claim 9: This is inherent in a control process.

Claim 11: It would have been obvious to store the information as recorded to provide control information for a similar or like process and therefore reaping the benefit of starting with prior obtained information.

Claims 13, 15, 16-18, and 20: The limitations of these claims are discussed above.

6. Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leluan in view of Gaughan and Glasier and further in view of *A reduced reaction model for carbon CVD/CVI processes* by Birakayala et al., hereafter Birakayala.

Leluan in view of Gaughan and Glasier discloses controlling the process by adjusting the flow rate of the gases in response to effluent gas concentrations, but fails to disclose measuring the amount of allene and/or propine content. However, Birakayala discloses allene and/or propine are known reaction products during the formation of carbon during a CVI process and therefore taking the references collectively, it would have been obvious to have modified Leluan in view of Gaughan



and Glasier to adjust the process parameters in response to the allene and/or propine concentration because Birakayala discloses such is present in measurable quantities in the effluent gas of a CVI carbon densification process.

***Allowable Subject Matter***

7. Claim 21 is allowed.
8. Claims 12 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior art cited or reviewed by the examiner, alone or in combination reasonably discloses the end of the densification process is detected by it becoming impossible to control the variation in the measured content by adjusting the selected parameter. Specifically, no prior art reasonably suggests a lack of control of the measure content of benzene, allene and/or propine indicates the end of the claimed densification process.

***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID TUROCY whose telephone number is (571)272-2940. The examiner can normally be reached on Monday, Wednesday and Friday from 7 a.m. - 6 p.m., Tuesday and Thursdays 7-10 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/David Turocy/  
Primary Examiner, Art Unit 1792